

# ABSTRACT OF THE DISCLOSURE

In a piezoelectric resonator, the temperature coefficient  $\epsilon_{TC}$  of the capacitance of the piezoelectric material, the bandwidth ratio  $\Delta f/f_0$ , the temperature coefficient  $Fr_{TC}$  of the resonance frequency, the temperature coefficient  $Fa_{TC}$  of the anti-resonance frequency, and a target value  $\alpha$  for the temperature coefficient of the center frequency satisfy the following expression:

$$| (Fr_{TC} + Fa_{TC})/2 + K \times \epsilon_{TC} \times (\Delta f/f_0) | \leq \alpha$$

where  $K$  = a coefficient determined according to the impedance at the midpoint between  $Fr$  and  $Fa$ ;  $\epsilon_{TC} = A \times$  (the amount of change in capacitance in a measured temperature range) / (the capacitance at a reference temperature  $\times$  the measured temperature range);  $\Delta f/f_0 = (Fa$  at the reference temperature -  $Fr$  at the reference temperature) / ( $f_0$  at the reference temperature);  $Fr_{TC} = A \times$  (the amount of change in  $Fr$  in the measured temperature range) / ( $Fr$  at the reference temperature  $\times$  the measured temperature range);  $Fa_{TC} = A \times$  (the amount of change in  $Fa$  in the measured temperature range) / ( $Fa$  at the reference temperature  $\times$  the measured temperature range); and  $A$  = a coefficient of +1 for a positive temperature coefficient and -1 for a negative temperature coefficient.

20250905 09:03:02